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FUMIGATION OF BULK SOIL WITH METHYL BROMIDE FOR THE

WHITE-FRINGED BEETLE IN NEW ORLEANS

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The Federal quarantine (No. 72) to prevent the artificial spread of the white-fringed beetle (Pantomorus leucoloma (Boh.) provides that potted plants, when grown under certain sanitary nursery conditions, may be certified for movement from the infested area. One of these prerequisites is that the soil used for potting be free from white-fringed beetle infestation. The work reported in this paper was carried out at New Orleans with the object of determining whether the fumigant methyl bromide might be used for this purpose. No previous data have been published on the use of this chemical as a fumigant for bulk soil infested by insects. Carbon disulfide is commonly used for this purpose.

Method and Procedure

A commercial grade of methyl bromide having a purity of approximately 99.5 percent was used. The properties of this chemical have been published by Hawkins,^{1/} and its uses are so well known that they need not be repeated here.

Two types of containers were used as fumatoria. These were (1) metal drums of various sizes, holding from 3.53 to 7.48 cubic feet, and (2) metal-lined wooden bins holding 1 cubic yard. The depth of the soil in the fumatoria ranged from 18 to 36 inches. White-fringed beetle larvae of all sizes, but usually full-grown, were either distributed throughout the soil bulk or confined in screen cages and placed at specified locations. The liquid fumigant was applied from a graduated cylinder to the surface of the soil, the dosage being divided among small depressions, which, immediately after receiving the fumigant, were covered with a handful of soil. The fumatorium was covered tightly, either with tarpaulin, rubberized roofing paper, or a metal cover.

The dosage of fumigant ranged from 7.7 to 38.3 cc. per cubic yard of soil. At the end of an exposure of 48 hours the larvae were removed from the soil and set aside on moist white sand for observations on mortality.

^{1/} Hawkins, Lon A. The use of methyl bromide for the treatment of quarantined products. U. S. Dept. Agr., Bur. Ent. and Plant Quar., E-484, 6 pp. (multigraphed), July 1939.

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Six types of soil used by nurseries in New Orleans were fumigated in the tests. The soil principally employed was a mixture of approximately equal parts of brown river silt, swamp leafmold, cured cow manure, and sand or field loam. This mixture, called "potting soil" in this paper, is friable, rich in humus, and highly absorptive. Other kinds of soil fumigated were builder's sand, used extensively in New Orleans at times in the preparation of artificial media for the growth of azaleas and camellias; alluvial silt, such as is deposited in the bottom of the lower Mississippi River Valley; red sandy loam; swamp leafmold, obtained from cut-over, drained swamplands of New Orleans and vicinity; and sphagnum moss. None of these were wet when being fumigated, but all were slightly moist.

Results of Experiments

The data obtained in the fumigation tests with the various types of soils are given in table 1.


This table shows that, in the experiments with "potting soil," dosages of 7.7 cc., 10.1 cc., and 38.3 cc. of methyl bromide per cubic yard of soil were used under different temperature conditions. In the experiments with a 7.7-cc. dosage the temperatures ranged from 42° to 60° F., and the resulting mortality averaged 73.0 percent. The 10.1-cc. dosage in experiments with temperatures ranging from 42° to 63° produced 90.3 percent mortality. The 38.3-cc. dosage with temperatures ranging from 42° to 70° gave complete mortality of the test larvae.

Following the finding that 38.3 cc. of methyl bromide produced complete mortality in the "potting soil" mixture, fumigations of builder's sand, alluvial silt, red sandy loam, swamp leafmold, and sphagnum moss with this dosage were carried out. The temperatures in these tests were higher than those reported for the "potting soil" fumigations, ranging from 68° to 83°. All tests with these soils resulted in complete kills of the test larvae.

Since establishment of the effectiveness of the 38.3-cc. dosage, fumigation of bulk soil with methyl bromide at the slightly higher rate of 40cc. per cubic yard has been employed intermittently, as a means of disinfesting it of white-fringed beetle larvae, by several commercial nurseries in New Orleans during a period of about a year, and in addition by one grower for all potting work during a period of approximately 6 months. No harmful effect on plants from the use of potting soil fumigated with methyl bromide has been noted. The cost of the fumigant is about 10 cents per cubic yard of soil.

Table 1.--Fumigation of 6 types of bulk soil with methyl bromide for the larva of the white-fringed beetle. New Orleans, La.

Series No.	Type of soil	Dosage in cu. yd. of soil	Size of soil bulk in cu. yds.	Temperature range in °F.	Larvae		
					Number used	Number killed	Percent killed
1	Potting mixture	7.7	0.13	42-60	100	60	60.0
2	do.	7.7	0.13	50-60	98	86	87.8
Total or average	do.	7.7		42-60	198	146	73.9
3	do.	19.1	0.13	42-60	105	102	97.1
4	do.	19.1	0.13	50-60	109	109	100.0
5	do.	19.1	0.13	62-63	100	100	100.0
6	do.	19.1	0.13	62-63	98	98	100.0
Total or average	do.	19.1		42-63	412	409	99.3
7	do.	33.3	0.13	59	97	97	100.0
8	do.	33.3	0.13	42-60	109	109	100.0
9	do.	33.3	0.13	50-60	100	100	100.0
10	do.	33.3	0.13	62-63	100	100	100.0
11	do.	33.3	0.13	52-63	110	110	100.0
12	do.	33.3	0.13	60-70	100	100	100.0
13	do.	33.3	0.13	60-70	99	99	100.0
14	do.	33.3	0.13	60-70	105	105	100.0
Total or average	do.	33.3		42-70	820	820	100.0
15	Builder's sand	33.3	0.23	74-83	135	135	100.0
16	do.	33.3	1.00	75-85	301	301	100.0
Total or average	do.	33.3		74-85	436	436	100.0
17	Alluvial silt	33.3	0.23	74-83	147	147	100.0
18	do.	33.3	0.23	75-85	211	211	100.0
Total or average	do.	33.3		74-85	358	358	100.0
19	Red sandy loam	33.3	0.23	68-83	203	203	100.0
20	Swamp leafmold	33.3	0.23	77-83	293	293	100.0
21	Sphagnum moss	33.3	0.23	70-83	206	206	100.0



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Summary

Experimental work with methyl bromide as a fumigant for "potting soil" and five additional types of soil at New Orleans showed that larval infestations of the white-fringed beetle (Pantomorus leucoloma (Roh.) in bulk quantities of these soils were destroyed by treatment with a dosage of 33.3 cc. per cubic yard for a period of 48 hours. The temperature in the tests with this dosage and exposure ranged from a minimum of 42° to a maximum of 83° F. No harmful effect on plants from the use of soil fumigated with methyl bromide has been noted by commercial users.

